



A snowflake is a flat figure whose area doubles over time as liquid droplets condense on its surface. For average cloud conditions, the area doubles every 2 hours.

No matter what the shape of a polygon, the area of a polygon will increase by a fixed amount as the size of the polygon increases.

Problem 1 - Suppose the time to double its area is 2 hours. How many doublings in area will have occurred in 8 hours?

Problem 2 – If the area of the snowflake at the start of its growth is 1 square millimeter, what will its area be after 8 hours? To organize your thinking about snowflake growth, create a table for the snowflakes size and area.

Problem 3 – If the size of the snowflake was 1 millimeter at the start of growth, what will be its size at the end of a snow storm that lasted 8 hours if the area doubling time is 2 hours? To organize your thinking about snowflake growth, create a table for the snowflakes size and area.

Problem 1 - Suppose the time to double its area is 2 hours. How many doublings in area will have occurred in 8 hours?

Answer: The snowflake has been growing for 8 hours which is $8/2 = 4$ **doubling times**.

Problem 2 – If the area of the snowflake at the start of its growth is 1 square millimeter, what will its area be after 8 hours?

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|-----------------|------------|----------|------------|-----------|------------|-----------|
| Doubling | 1 | 2 | 3 | 4 | 5 | 6 |
| Area | 2 | 4 | 8 | 16 | 32 | 64 |
| Size | 1.4 | 2 | 2.8 | 4 | 5.7 | 8 |

Answer: It will have an area that is $2 \times 2 \times 2 \times 2 = 16$ times larger or **16 square millimeters**.

Problem 3 - If the size of the snowflake was 1 millimeter at the start of growth, what will be its size at the end of a snow storm that lasted 8 hours if the area doubling time is 2 hours?

Answer: 8 hours = 4 doubling times so it has increased in area by 16 times. Because area = length x length, since $16 = 4 \times 4$, the snowflake has increased its size by 4 times so it is now $1 \text{ mm} \times 4 = 4$ **millimeters in diameter**.